

Agenda Item E-2

39 th Argos Operations Committee meeting
Prepared by CNES
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The Argos-3 (or A-DCS) instruments

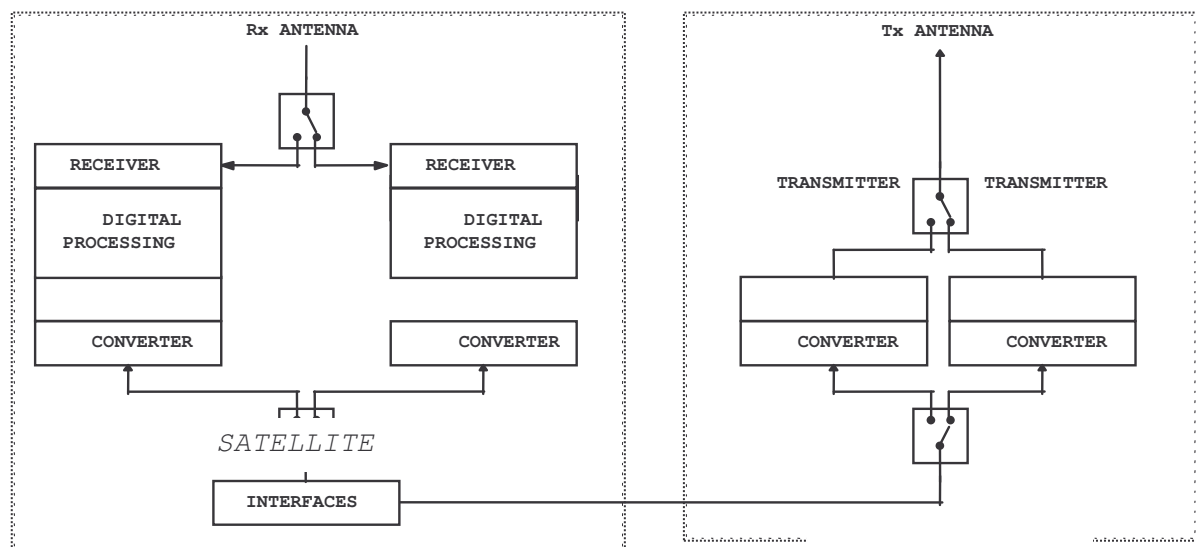
1- The Argos-3 Mission

The main objectives of the ARGOS-3 (or A-DCS for Advanced Data Collection System) Mission are recalled hereunder :

- To insure the continuity of the system with the current Platforms named PTT-A2.
- To improve the performance of the ARGOS system in terms of waiting time and overall data collection capability. The bandwidth of the ARGOS-3 receiver is now 110 kHz (24 kHz for Argos-1 and 80 kHz for ARGOS-2)
- To provide users with the downlink message function, validated by the ARGOS-Next instrument installed on JAXA's ADEOS-II (now out of service), namely a space-to-earth link dedicated to the transmission of messages to the ARGOS Platforms fitted with appropriate receivers. This downlink will allow :
 - to acknowledge their uplink messages and then to increase the capacity of the system,
 - to transmit broadcasting messages as time or orbit ephemeris in order to activate the platforms emitters only when a satellite is above
 - to modulate the length of the messages or the repetition period of the messages according to the user needs.
- To improve the performance of the ARGOS system in terms of overall data collection capability, through the introduction of a new kind of Platforms: the high data-rate transmitters named PTT-HD or PMT-HD. Those Platforms are not designed to be autonomously located by Doppler technique. However they may be located using an integral navigation receiver.
- To provide a better sensitivity thanks to a new kind of ARGOS-3 Platforms, called the new generation Platforms PTT-A3, PTT-ZE, PMT-A3. Those Platforms have the capability of a very low-power consumption.
- To upgrade the data management system for the function "User Messages to Platforms" under the responsibility of the Downlink Messages Management Center (DMMC) located in Toulouse.

2- The Argos-3 instrument

The general architecture of the Argos-3 instrument is presented below :



The ARGOS-3 Instrument is composed as follows :

- The Receiver Processor Unit (RPU) doing :
 - The processing of the received uplink signals
 - The downlink management
 - The interfaces with the receiver, the TXU and the satellite
- The Transmitter Unit (TXU) sending the emissions to the ground
- The Harness for the RPU to TXU connection

The RPU and TXU boxes have a cold internal redundancy that can be activated by TC LEVEL. In the same way, the USO (Ultra Stable Oscillator) has a cold redundancy.

The ARGOS-3 instrument has been developed by using full digital processing signal technics and the Software managing the downlink has been completely re-designed.

The following Table presents the main characteristics of the ARGOS 1/2/Next/3 Instruments :

| Center frequency : 401.650 MHz | ARGOS-1 | ARGOS-2 | ARGOS-Next | ARGOS-3 |
|-----------------------------------|----------|----------|------------|---|
| Frequency Range | 24 kHz | 80 kHz | 80 kHz | 110 kHz |
| DRU number | 4 | 8 | 8 | 9 low data rate + 3 high data rate |
| Uplink data rate | 400 bps | 400 bps | 400 bps | 400 bps (low) + 4800 bps (high) |
| Downlink | NO | NO | YES | YES |
| Downlink data rate | - | - | 200 bps | 400 bps (nominal) or 200 bps |
| Satellites | < NOAA K | ≥ NOAA K | ADEOS II | METOP 1, 2, 3 NOAA N' NPOESS C2 (TBC) |

3- Argos-3 on-board METOP 1, 2 and 3

Three Argos-3 instruments will fly with the three METOP satellites of Eumetsat in 2006, 2010 and 2015.

The instruments have been integrated under the responsibility of the SSST Team (Eumetsat + ESA), first in ALENIA on a specific panel dedicated to NOAA instruments (A-DCS, SARP and SARR) then on the METOP Payload Module in Astrium-D (Friedrichshafen) and at the end on the Satellite in Astrium-F (Toulouse).

The satellite tests (Thermal Vacuum, Mechanical , EMC) have been performed in several places (Astrium, Intespace, Estec).

METOP-2 : it will be the first satellite expected to be launched in April 2006. The Flight Acceptance Review is currently in progress and the satellite will enter in a Storage Phase from July to December 2005.

In December, after a final run of SSVT tests (Satellite System Validation Tests), the satellite will travel to Baïkonour for the Launch Campagne.

It is expected to activate the Argos-3 instrument through very limited functional tests.

The Argos-3 instrument on-board METOP-2 is the Flight Model FM2. It has been delivered to Alenia in October 2002.

Processing software has been reloaded in April 2004 in Astrium-D.

METOP-1 : this satellite is currently in Storage (and should stay in this state until 2008). It is the first satellite built by Astrium but in an uncompleted version (several instruments have been provided too late or in a uncompleted version).

It was the case of the A-DCS instrument and the first flight model FM1 delivered to Alenia in February 2002 has been replaced in August 2004 by the FM5 (with new versions of management software and processing software).

METOP-1 should be launched in 2010.

METOP-3 : this satellite is currently in Storage (the payload module in Astrium-D, the platform in Astrium-F). The satellite activities should be re-started in 2008, in parallel of METOP-1.

The Argos-3 instrument on-board METOP-3 is the Flight Model FM4. It has been delivered to Alenia in May 2003.

Processing software has been reloaded in May 2004 in Astrium-D.

METOP-1 should be launched in 2015.

4- Argos-3 on-board NOAA-N'

NOAA-N' is the last satellite of the POES family. It will embark an Argos-3 instrument, this one presenting the same mechanical and electrical interface as the Argos-2 instrument in order to minimize the modifications on the platform.

The NOAA-N' Argos instrument is identical to the METOP ones, excepted the DC/DC converter card that has been modified to decrease the current ripple (the modification implying a power consumption increase).

The Argos-3 instrument on-board NOAA-N' is the Flight Model FM3. It has been delivered to Alenia in December 2002, and then returned in France after the satellite accident of September 2003.

The instrument has not been damaged by the fall, has been upgraded by Thalès (processing software) and will be delivered again in September 05 in Lockheed Martin (Sunnyvale, CA).

The NOAA-N' should be launched in 2008.

5- Argos-3 on-board NPOESS

An Argos-3 instrument should fly on the NPOESS-C2 satellite (from IPO) on the afternoon orbit (at 13:30). The Launch is scheduled in 2011.

The Argos-3 instrument expected to be mounted on-board NPOESS-C2 is the Flight Model FM1. This model was initially mounted on-board METOP-1, but it has been dismounted in 2004 since it was not in its final state. The management software and the processing software have been uploaded by Thalès end of 2004. The "recette" has been performed early 2005 and the Test Review has been hold. The equipment will be stored in CNES until 2009. It should be delivered to Northrop Grumman in January 2010.

An instrument simulator has to be delivered to Northrop in September 2006, then an EDU (Engineering Development Unit) in 2007/2008.

There will be no Argos-3 instrument on NPOESS-C1, the orbit @ 21:30 being covered by the METOP satellites.

Future generation of Argos instruments (Argos-4 ?) could also fly on NPOESS-C3, NPOESS-C6 (orbits @ 17:30) and on NPOESS-C5 (orbit at 13:30)